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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/080,890	02/22/2002	Huitao Luo	10017759-1	9393

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HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P.O. Box 272400
Fort Collins, CO 80527-2400

EXAMINER	
HUNG, YUBIN	

ART UNIT	PAPER NUMBER
2625	

DATE MAILED: 02/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/080,890	LUO, HUITAO	
	Examiner	Art Unit	
	Yubin Hung	2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 February 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *3/25/02*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:

- P. 1, paragraph [0003], line 7: "Chie" should have been "Chiu"
- P. 6, paragraph [0024], lines 8 and 10: the last R(x,y) in each of the group definitions should have been (x,y) instead
- P. 6, paragraph [0025], the two equations: N_p should have been $N_p(x_0,y_0)$ and similarly for N_n
- P. 7, paragraphs [0027] and [0028]: diff, α, M, I_p, I_n, W_p, W_n, N_p, N_n should all have been evaluated at (x,y) or (x_0,y_0) as appropriate

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 10 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 10 recites the limitation "seed value" in line 1. There is insufficient antecedent basis for this limitation in the claim. (Examiner's comment: it appears that claim 10 should have been dependent from claim 9.)

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claim 1, 5, 11 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moroney ("Local Color Correction Using Non-Linear Masking," *2000 IS&T/SID 8th Color Imaging Conference*, pp. 108-111), in view of Bloomberg et al. (US 5,619,592) and Kikuchi et al. (US 6,064,776).

7. Regarding claim 1, and similarly claims 11 and 18, Moroney discloses

- low-pass filtering said gray-scale component to produce an image mask and enhancing tone reproduction of said digital image utilizing at least said image mask
  [Fig. 1, blocks labeled "F(i)", "Mask Image" (mask generation using low-pass filtering) and "G(i,m)" (enhancing); PP. 108-109: Section "Basic Algorithm"]

Moroney does not expressly disclose

- morphologically filtering said grayscale component to produce a segmentation result
- that low-pass filtering said gray-scale component to produce an image mask is under control of at least said segmentation result

However, Bloomberg teaches applying morphological operations (including opening, closing, erosion and dilation) to obtain segment data [Col. 18, lines 27-31] and Kikuchi teaches filtering under the control of a segmentation result [Fig. 22; Col. 18, lines 5-30].

Moroney, Bloomberg and Kikuchi are combinable because they all have aspects that are from the field of endeavor of image filtering.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify Moroney with the teaching of Bloomberg and Kikuchi by morphologically filtering an image to obtain segmentation result and then using the segmentation result to control a subsequent filtering operation. The motivation would have been to be able to adaptively filter pixels of an image, depending on the segment it belongs to, in order to obtain a better result, since the image characteristics can vary from segment (or block) to segment, as pointed out by Kikuchi in Col. 18, lines 20-22.

Therefore, it would have been obvious to combine Bloomberg and Kikuchi with Moroney to obtain the invention as specified in claim 1.

8. Regarding claim 5, **official notice** is taken that in digital image processing low-pass filtering by definition operates on an area of pixels defined by its kernel.

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9. Claims 2-4, 13, 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moroney ("Local Color Correction Using Non-Linear Masking," *2000 IS&T/SID 8th Color Imaging Conference*, pp. 108-111), Bloomberg et al. (US 5,619,592) and Kikuchi et al. (US 6,064,776) as applied to claims 1, 5, 11 and 18 above, and further in view of Lee et al. (US 5,978,497).

10. Regarding claim 2, and similarly claim 14, the combined invention of Moroney, Bloomberg and Kikuchi teaches all limitations of its parent, claim 1.

The combined invention of Moroney, Bloomberg and Kikuchi does not expressly disclose

- `quantizing said grayscale component before morphologically filtering said grayscale component`

However, Lee teaches quantizing a grayscale image before morphologically filtering it. [Fig. 3A, refs. 35-39; Col. 9, lines 30-32; Col. 10, lines 6-11. Note that binarization is a type of quantization.]

The combined invention of Moroney, Bloomberg and Kikuchi is combinable with Lee because they have aspects that are from the same field of endeavor of image enhancement.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Moroney, Bloomberg and Kikuchi with the teaching of Lee by quantizing a grayscale image before morphologically filtering it. The motivation would have been to further separate connected components, as Lee indicates in Col. 10, lines 3-11.

Therefore, it would have been obvious to combine Lee with Moroney, Bloomberg and Kikuchi to obtain the invention as specified in claim 2.

11. Regarding claim 3, Lee further discloses

- decomposing said grayscale component into a plurality of binary images [Fig. 3A, refs. 35-39; Col. 9, lines 30-32]

12. Regarding claim 4, and similarly claims 13, Lee further discloses

- said morphologically filtering said grayscale component comprises morphologically filtering each of plurality of binary images [Fig. 3A, refs. 35-39; Col. 9, lines 30-32; Col. 10, lines 3-36. Note that while Lee has not expressly disclosed that the low threshold binary image (mask) is also morphologically filtered, it would have been obvious to one of ordinary skill in the art to also apply such an operation, as is done to the other two binary images. The motivation would have been to use algorithms (for morphological filtering) that have already been developed (and most likely coded) to remove small connected components, as carefully selected erosion and dilation operations are known to be able to accomplish.]

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13. Claims 6-8, 15-17 and 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moroney ("Local Color Correction Using Non-Linear Masking," *2000 IS&T/SID 8th Color Imaging Conference*, pp. 108-111), Bloomberg et al. (US 5,619,592)

and Kikuchi et al. (US 6,064,776) as applied to claims 1, 5, 11 and 18 above, and further in view of Doerfel (US 6,085,152).

14. Regarding claims 6-8, and similarly claims 15-17 and 20-21, the combined invention of Moroney, Bloomberg and Kikuchi teaches all limitations of its parent, claim 5.

The combined invention of Moroney, Bloomberg and Kikuchi does not expressly disclose that said low-pass filtering is operable to

- (claim 6) calculate a first average value over a peer group, wherein said peer group is each pixel within said filter kernel that possess a same segmentation value as a selected pixel
- (claim 7) calculate a second average value over a non-peer group, wherein said non-peer group is each pixel within said filter kernel that does not possess the same segmentation value as the selected pixel

and that

- (claim 8) said image mask is a matrix of values with each value being a function of at least said first average value and said second average value

However, Doerfel teaches computing the average value of pixels belong to an object (the peer group) and the average value of the background pixels (the non-peer group) in a region surrounding the object in order to determine their contrast, which in turn determines the visibility of the pixels in the object. [Fig. 3; Col. 5, lines 34-42. Note that the region surrounding the object is considered to correspond to a filter kernel area. Note further that the visibility determination results in a binary mask.]

The combined invention of Moroney, Bloomberg and Kikuchi is combinable with Doerfel because they have aspects that are from the same field of endeavor of image processing.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Moroney, Bloomberg and Kikuchi with the teaching of Doerfel by computing the average value of pixels belong to an object (the peer group) and the average value of the background pixels (the non-peer group) in a region surrounding the object. The motivation would have been to determine the contrast between an object and its surrounding and to use the information for further decision making such as the determination of the visibility of objects, as Doerfel indicates in Col. 2, lines 11-14.

Therefore, it would have been obvious to combine Doerfel with Moroney, Bloomberg and Kikuchi to obtain the inventions as specified in claims 6-8.

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15. Claims 9, 10, 12 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moroney ("Local Color Correction Using Non-Linear Masking," *2000 IS&T/SID 8th Color Imaging Conference*, pp. 108-111), Bloomberg et al. (US 5,619,592) and Kikuchi et al. (US 6,064,776) as applied to claims 1, 5, 11 and 18 above, and further in view of Masataka (JP 2000-310987, with English Abstract).

16. Regarding claims 9, 10, and similarly claims 12 and 19, the combined invention of Moroney, Bloomberg and Kikuchi teaches all limitations of their parent, claim 1.

The combined invention of Moroney, Bloomberg and Kikuchi does not expressly disclose

- (claim 9) applying a seed value that is operable to affect a global modification of tone reproduction
- (claim 10) said seed value is selected by a region of interest algorithm

However, Masataka teaches applying a seed value that is operable to affect a global modification of tone reproduction and wherein the seed value is selected by a region-of-interest algorithm. [Abstract; Fig. 1, refs. 3-5. Note that W_1 is a region of interest, P_{r1} is its corresponding seed value and 51a is the result of tone modification (to the image 1a) with respect to the seed value P_{r1}.]

The combined invention of Moroney, Bloomberg and Kikuchi is combinable with Masataka because they have aspects that are from the same field of endeavor of image filtering.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Moroney, Bloomberg and Kikuchi with the teaching of Masataka by applying a seed value that is operable to affect a global modification of tone reproduction and wherein the seed value is selected by a region-of-interest

algorithm. The motivation would have been to automatically conduct a pixel value converting process that normally requires cumbersome operations, as Masataka indicates in "Problem to be solved" part of the abstract.

Therefore, it would have been obvious to combine Masataka with Moroney, Bloomberg and Kikuchi to obtain the inventions as specified in claims 9-10.

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17. Claim 22 rejected under 35 U.S.C. 103(a) as being unpatentable over Moroney ("Local Color Correction Using Non-Linear Masking," *2000 IS&T/SID 8th Color Imaging Conference*, pp. 108-111), Bloomberg et al. (US 5,619,592), Kikuchi et al. (US 6,064,776) and Doerfel (US 6,085,152) as applied to claims 6-8, 15-17 and 20-21 above, and further in view of Lee et al. (US 5,978,497).

18. Regarding claim 22, the combined invention of Moroney, Bloomberg, Kikuchi and Doerfel teaches all limitations of its parent, claim 21.

The combined invention of Moroney, Bloomberg, Kikuchi and Doerfel does not expressly disclose

- decomposing said grayscale component into a plurality of binary images [Fig. 3A, refs. 35-39; Col. 9, lines 30-32]

However, Lee teaches quantizing a grayscale image before morphologically filtering it. [Fig. 3A, refs. 35-39; Col. 9, lines 30-32; Col. 10, lines 6-11. Note that binarization is a type of quantization.]

The combined invention of Moroney, Bloomberg, Kikuchi and Doerfel is combinable with Lee because they have aspects that are from the same field of endeavor of image enhancement.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Moroney, Bloomberg, Kikuchi and Doerfel with the teaching of Lee by quantizing a grayscale image before morphologically filtering it. The motivation would have been to further separate connected components, as Lee indicates in Col. 10, lines 3-11.

Therefore, it would have been obvious to combine Lee with Moroney, Bloomberg, Kikuchi and Doerfel to obtain the invention as specified in claim 22.

Conclusion and Contact Information

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See below:

- Edgar et al. (US 6,487,321) – discloses a method for altering defects in a digital image by computing a weighted average of a selected pixel and its neighbors that belong to the same segment
- Shimazu et al. (US 5,724,454) – discloses a method for correcting multi-tone images by morphologically filtering each of the three binary images obtained from the multi-tone image

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yubin Hung whose telephone number is (703) 305-1896. The examiner can normally be reached on 7:30 - 4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (703) 308-5246. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Yubin Hung
Patent Examiner
January 24, 2005

BHAVESH M. MEHTA
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600